C L A I M S

1. A method of moulding and curing tyres for vehicle wheels, comprising the following steps:

- disposing a tyre being processed (7) on a toroidal support (10) the outer surface (10a) of which substantially mates an inner surface (7b) of the tyre itself;
- closing the tyre (7) and the toroidal support (10) inside a moulding cavity (6) defined in a vulcanization mould, said moulding cavity (6) having walls the shape of which matches that of an outer surface (7a) of the tyre (7) when vulcanization has been completed;
- pressing the tyre (7) by its outer surface (7a) against the moulding cavity (6) walls;
- administering heat to the tyre being processed (7) to cause a molecular crosslinking of same,

characterized in that said pressing step comprises the following actions:

- compressing side portions (8) of the tyre (7), extending away from the inner circumferential edges (8a) thereof, between the walls of the moulding cavity (6) and the outer surface (10a) of the toroidal support (10), concurrently with said closing step;
- imposing an expansion to a radially outer portion (9) of the tyre (7), delimited between said side portions (8), to bring said radially outer portion (9) against the inner walls of the moulding cavity (6).

2. A method as claimed in claim 1, wherein tyre (7) expansion is carried out through a step of admitting a fluid under pressure to at least one fluid-diffusion interspace (19) created between the outer surface (10a) of the toroidal support (10) and the inner surface (7b) of the tyre (7).

3. A method as claimed in claim 2, wherein before

admission of fluid under pressure the inner surface (7b) of the tyre (7) substantially adheres, over its whole extension, to the outer surface (10a) of the toroidal support (10), said diffusion interspace (19) being created following tyre (7) expansion.

4. A method as claimed in claim 1, wherein admission of fluid under pressure takes place through feeding channels (17a, 17b, 17c) formed in the toroidal support (10) and opening onto the outer surface (10a) of the latter.

5. A method as claimed in claim 2, wherein before said pressing step, a preforming step of the tyre (7) is carried out by preliminary admission of a working fluid between said outer surface (10a) of the toroidal support (10) and the inner surface (7b) of the tyre (7), under a lower pressure than that of the pressurized fluid admitted during the pressing step.

6. A method as claimed in claim 2, wherein heat administration takes place by admission of a heating fluid to said diffusion interspace (19), said heating fluid comprising the same fluid under pressure as employed for carrying out the pressing step.

7. A method as claimed in claim 2, wherein fluid under pressure is introduced into an upper portion of the moulding cavity (6) and guided along an inner surface of the toroidal support (10) towards a lower portion of the cavity itself.

8. A method as claimed in claim 7, further comprising a step of drawing said fluid under pressure out of the lower portion of the moulding cavity (6), carried out concurrently with said introduction step, so as to create a pressurized fluid stream along the inner surface of the toroidal support (10) and the diffusion interspace (19).

9. A method as claimed in claim 7, wherein a rotational movement around a geometric axis of the toroidal support (10) is imparted to the fluid under pressure introduced into the moulding cavity (6).

10. A method as claimed in claim 2, wherein said diffusion interspace (19) has an extension of between 3 mm and 14 mm, measured between the inner surface (7b) of the tyre (7) and the outer surface (10a) of the toroidal support (10) at least at an equatorial plane (X-X) of the tyre itself.

11. A method as claimed in claim 1, wherein said expansion involves an increase in the tyre (7) circumference included between 1% and 3.5%, measured at an equatorial plane (X-X) of the tyre itself.

12. A method as claimed in claim 1, wherein the step of disposing the tyre (7) on the toroidal support (10) is carried out by directly manufacturing the tyre on the toroidal support.

13. A method as claimed in claim 1, wherein before admission of fluid under pressure, a treatment of the inner surface (7b) of the tyre (7) is carried out for preventing permeation of the pressurized fluid through the elastomer material forming the green tyre.

14. A method as claimed in claim 1, wherein a prevulcanized liner is directly formed on the toroidal support (10) during a preliminary step of the tyre (7) manufacture, to prevent permeation of said pressurized fluid through the elastomer material forming the green tyre.

15. An apparatus for moulding and curing tyres for vehicle wheels, comprising:

- a toroidal support (10) arranged to engage a tyre being processed (7), said toroidal support (10) having an outer surface (10a) substantially mating an inner surface (7b) of the tyre itself;
- a vulcanization mould (2) arranged to receive the toroidal support (10) carrying the tyre being processed (7) within a moulding cavity (6) having a tyre-holding space delimited between the outer surface of the toroidal support (10) and walls of the moulding cavity (6) itself mating an outer surface (7a) of the cured tyre (7);
- pressing devices (4a, 4b, 13, 19) for pressing the outer surface (7a) of the tyre (7) against the inner wall of the mould (6);
- heating devices for transmitting heat to the tyre (7) enclosed in the moulding cavity (6),

characterized in that, under said closed condition, said holding space has radially inner portions having shape and sizes substantially corresponding to the shape and sizes of side portions (8) of the tyre (7), extending away from inner circumferential edges (8b) of same, and a radially outer portion having radial dimensions greater than the radial dimensions of a radially outer portion (9) of the tyre (7) extending between the side portions (8) of the tyre itself.

16. An apparatus as claimed in claim 15, wherein said pressing devices comprise channels (17a, 17b, 17c) for feeding fluid under pressure which are formed through the toroidal support (10) and open into the outer surface (10a) of said support.

17. An apparatus as claimed in claim 15, wherein said holding space when the mould (2) is closed has a greater volume than the volume taken up by the tyre (7) itself.

18. An apparatus as claimed in claim 16, wherein said feeding channels (17a, 17b, 17c) open into at least one

interspace (19) for diffusion of the fluid under pressure, defined in the radially outer portion of said holding space, between the outer surface (10a) of the toroidal support (10) and the inner surface (7b) of the tyre being processed (7).

19. An apparatus as claimed in claim 15, wherein the outer surface (10a) of the toroidal support (10) has a lower extension than the extension of the inner surface (7b) of the vulcanized tyre (7).

20. An apparatus as claimed in claim 16, further comprising at least one guide duct (16) for said fluid under pressure extending along an inner surface of the toroidal support (10) and terminating at said feeding channels (17a, 17b, 17c).

21. An apparatus as claimed in claim 20, wherein said guide duct (16) is confined between the inner surface of the toroidal support (10) and a filling structure (18) fastened to the inside of the toroidal support itself.

22. An apparatus as claimed in claim 21, wherein said filling structure has an outer surface substantially extending parallelly to the inner surface of the toroidal support.

23. An apparatus as claimed in claim 21, wherein said filling structure (18) comprises an upper portion (18a) having an outer surface substantially parallel to the inner surface of the toroidal support (10), and a lower portion (18b) having a base surface with a slightly inclined orientation relative to a horizontal plane.

24. An apparatus as claimed in claim 20, wherein said pressing means comprises circumferentially-distributed admission nozzles (15) oriented towards an end of said

guide duct (16).

25. An apparatus as claimed in claim 24, wherein said admission nozzles (15) are oriented towards an inlet end of said guide duct (16), disposed above an equatorial plane (X-X) of the toroidal support.

26. An apparatus as claimed in claim 24, wherein said admission nozzles (15) have an inclined orientation relative to a direction radial to a geometric axis (Y) of the toroidal support (10).

27. An apparatus as claimed in claim 16, comprising at least a first and a second series (17a, 17b) of said feeding channels located at respectively opposite positions relative to an equatorial median plane (X-X) of the toroidal support and oriented towards directions respectively converging away from a geometric axis (Y) of the toroidal support.

28. An apparatus as claimed in claim 15, wherein said toroidal support (10) has at least one centering shank (11) for engagement in a centering seating (12) associated with the mould (2) for fixing positioning of the toroidal support (10) and the tyre (7) in the moulding cavity (6).

29. An apparatus as claimed in claim 28, wherein said centering shank (11) extends along a geometric axis common to said toroidal support (10), to said tyre being processed (7) and to said moulding cavity (6).

30. An apparatus as claimed in claim 16, wherein said heating devices preferably comprise at least one duct (13) to send a heating fluid to the feeding channels (17a, 17b, 17c).

31. An apparatus as claimed in claim 16, wherein said heating fluid comprises the same fluid under pressure as admitted to said feeding channels (17a, 17b, 17c).

32. An apparatus as claimed in claim 15, wherein said toroidal support (10) has a structure elastically yielding in an axial direction, at least at regions corresponding to inner circumferential edges (7b) of the tyre (7).

33. An apparatus as claimed in claim 15, wherein said toroidal support (10) has a structure elastically yielding in an axial direction at regions corresponding to the side portions (8) of the tyre (7).